

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008

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R E M A R K S

Telephone Interview With Examiners

The undersigned had a telephone interview on July 9, 2008 with Examiners Benjamin Gillespie and Rabon Sergent to discuss the prior art rejection set forth in the April 24, 2008 Office Action.

During the telephone interview, the undersigned discussed with the Examiners the calculation of the amounts of 22 to 50 wt.% crystalline polyester polyol, 0 to 42 wt.% amorphous polyester polyol and 22 to 50 wt.% polycarbonate polyol, as set forth in item no. 6 on page 4, lines 9 to 11 of the April 24, 2008 Office Action. Such amounts were alleged in the April 24, 2008 Office Action to be based on a combination of the Greco and Kube references.

During the telephone interview, Examiner Gillespie said that the calculations of the amounts of the crystalline polyester polyol (22 to 50 weight %), the amorphous polyester polyol (0 to 42 weight %) and the polycarbonate polyol (22 to 50 weight %) as set forth in item no. 6 on page 4 of the April 24, 2008 Office Action were based on substituting 50% polycarbonate only for

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008

crystalline polyester (not amorphous polyester). Examiner Gillespie said that his calculations were based on column 3, lines 36 to 39 of Greco which disclose "crystalline polyesters of the linear aliphatic type, and in particular the polyadipates", and column 4, lines 54 to 60 of Greco which disclose "The use of the polycarbonates of the present invention instead of polyadapters... (up to 50% by weight)."

During the telephone interview with the Examiners, the undersigned raised the issue whether Greco taught a polyester polyol. In reply, Examiner Gillespie said that Example 15 of Greco states that "the same procedures as the polycarbonate diol of Examples 9-14" was used and that coupling was carried out with "a ratio of NCO/OH of 3.2." Based on such disclosure in Greco, Examiner Gillespie concluded that Example 15 of Greco refers to a hydroxy terminated polyester.

#### Applicants' Present Claims

Applicants' present claims are directed to a reactive hot melt composition obtained by reacting  
(i) a polyol mixture comprising:

Appl. No. 10/529,780

Reply to Office Action mailed April 24, 2008

(1) 30 to 90% by weight of a crystalline polyester polyol having a number average molecular weight of 1,500 to 10,000, produced from at least one aliphatic dicarboxylic acid and a first aliphatic diol as main components,

(2) 5 to 30% by weight of a polyester polyol having a number average molecular weight of 1,500 to 10,000, produced from at least one aromatic polycarboxylic acid and a second aliphatic polyol as main components, and

(3) 5 to 40% by weight of a polycarbonate polyol having a number average molecular weight of 500 to 5,000, and

(ii) a polyisocyanate, wherein a molar ratio of the OH group of the polyol mixture to the NCO group of the polyisocyanate is 1:1.7 to 1:2.5,

the composition has a viscosity at 120°C of 200 to 40,000 cps, and the composition is used as a molded product in the fields of an electric and electronic parts producing industry and a semiconductor parts producing industry.

Appl. No. 10/529,780

Reply to Office Action mailed April 24, 2008

Rejection Under 35 USC 103

Claims 8 to 11, 13, 14 and 22 to 28 were rejected under 35 USC 103 as being unpatentable over USP 6,191,212 to Kube and in view of USP 5,288,839 to Greco and further in view of USP 6,821,110 to Carlson et al. for the reasons set forth in item nos. 2 to 14 on pages 2 to 6 of the April 24, 2008 Office Action.

Discussion of the References

Kube (USP 6,191,212) teaches a moisture-curing hot-melt adhesive containing polyurethane prepolymers with an isocyanate group which is obtained by reacting crystalline polyester polyols, optionally mixed with liquid and/or amorphous polyester and/or polyether polyols having an isocyanate functionality greater than one as described in the abstract thereof.

It was admitted in the April 24, 2008 Office Action that Kube (USP 6,191,212) is silent in disclosing the presence of a polycarbonate polyol in the polyol mixture.

Greco (USP 5,288,839) teaches diol-terminated polycarbonates (i.e., polycarbonate diol) for the synthesis of prepolymers which are used in reactive adhesives and/or sealing formulations of the

Appl. No. 10/529,780

Reply to Office Action mailed April 24, 2008

hygro-, photo- or thermo-setting type as disclosed in column 1, lines 4 to 8 of Greco (USP 5,288,839).

In the background art section in Greco (USP 5,288,839), the use of crystalline polyesters mixed with amorphous polyesters is discussed in column 1, lines 48 to 56 of Greco (USP 5,288,839) to reduce shrinkage in the crystalline phase and to increase the initial tack (polycarbonates are not discussed in column 1, lines 46 to 48 of Greco (USP 5,288,839)). In Greco (USP 5,288,839), there is thus a reference to crystalline polyesters and amorphous polyesters, but there is no teaching or suggestion of a mixture of crystalline polyester polyol and a polyester polyol, as recited in applicants' claims.

Carlson et al. (USP 6,821,110) discloses merely polyamide hot-melt compositions that are molded in injection-molded machines. In column 3, line 49 of Carlson et al. (USP 6,821,110), a "polyamide adhesive" is disclosed, but there is no description in the reference pertaining to "polyester-amides" mentioned on page 4, line 17 of the Office Action. A polyester-amide is considered to be different from a "polyamide."

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JUL 18 2008

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008Positions Taken in the April 24, 2008 Office Action

In item no. 4 on page 3 of the April 24, 2008 Office Action,  
the following is stated:

"...patentee [Greco] explains that the polyol preferably consists of hexane-diol based polycarbonate polyol that has a molecular weight as low as 1,500, and can include up to 505 by weight of polyester polyol."

In item no. 6 on page 4 of the April 24, 2008 Office Action,  
the following is stated:

"...Greco teaches 50% polycarbonate polyol relative to the polyester, this amount is drawn to the crystalline polyester. Applying this limitation to Kube, i.e. 42-100% by weight crystalline polyester polyol, and 0-42% by weight amorphous polyester polyol as based on the ranges listed on column 3 lines 44-46, the relative amounts of each polyol would consist of:  
22-50% by weight crystalline polyester polyol  
0-42% by weight amorphous polyester polyol and  
22-50% by weight polycarbonate polyol."

Rebuttal to the Positions Taken in the Office Action

Kube (USP 6,191,212) at column 3, lines 44 to 46 disclose  
"94 to 40% by weight of crystalline polyester polyols, 0 to 40%  
by weight of liquid and/or amorphous polyester polyols or

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008

polyether polyols." These amounts are different from the amounts set forth in item no. 6 on page 4 of the April 24, 2008 Office Action. Applicants thus question the basis of the aforesaid calculation in item no. 6 on page 4 of the April 24, 2008 Office Action. It is noted that 6 to 20% by weight of polyisocyanates, as disclosed in column 3, line 54 of Kube (USP 6,191,212), is irrelevant, since this is not a polyol.

The calculation set forth in item no. 6 on page 4 of the April 24, 2008 Office Action appears to be incorrect, since the total amounts of the crystalline polyester polyol (22 to 50% by weight), the amorphous polyester polyol (0 to 42% by weight) and the polycarbonate polyol (22 to 50% by weight), as set forth in item no. 6 on page 4 of the April 24, 2008 Office Action, do not result in a total of 100% by weight. That is, if the amount of the polycarbonate polyol is 22% by weight, the amount of the crystalline polyester polyol cannot exceed 22% by weight, since only a half of the polycarbonate polyol would replace the crystalline polyester polyol. Even if the amount of the amorphous polyester polyol is 42% by weight, the total amount would be 86% by weight (22 weight % + 22 weight % + 42 weight %). In view of the above, there does not appear to be a basis for the

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008

calculated amounts of "22%" for the crystalline polyester polyol, "22%" for the polycarbonate polyol and "42%" for the amorphous polyester polyol, as set forth in item no. 6 on page 4 of the April 24, 2008 Office Action.

Applicants respectfully submit that the calculated amounts for the polyols set forth in item no. 6 on page 4 of the April 24, 2008 Office Action appear to have been based on a misapplication of a substitution of polycarbonate polyol with crystalline polyol. That is, Greco (USP 5,288,839) discloses "The use of the polycarbonates of the present invention, instead of polyadipates ... a polyester (up to 50% by weight)." However, there is no teaching or suggestion that a polyester polyol may be replaced with a polycarbonate polyol anywhere in Greco (USP 5,288,839) or Kube (USP 6,191,212). Following the reasoning in the April 24, 2008 Office Action, up to 50% by weight of the polycarbonate polyol could be replaced with a crystalline polyester polyol, but the opposite is not disclosed or suggested in Greco (USP 5,288,839), since the main component of Greco (USP 5,288,839) is a polycarbonate polyol. Thus, it is respectfully submitted that there is no teaching, suggestion or motivation to replace a half amount of the crystalline polyester polyol of Kube



Appl. No. 10/529,780

Reply to Office Action mailed April 24, 2008

(USP 6,191,212) with the polycarbonate of Greco (USP 5,288,839).

When the above-mentioned amounts of polyester polyols of Kube (USP 6,191,212) are made 100% by weight in total (i.e., "100 to 50% by weight of crystalline polyester polyols, and 0 to 50% by weight of liquid and/or amorphous polyester polyols or polyether polyols") and a half amount of the polyester polyols is replaced with a polycarbonate polyol, then the amounts thereof become as follows:

25-50% by weight crystalline polyester polyol

0-25% by weight amorphous polyester polyol, and

50% by weight or more of polycarbonate polyol,

since the main component of Greco (USP 5,288,839) is polycarbonate polyol.

The above range of the polycarbonate polyol is out of the scope of applicants' present claims (i.e., applicants' claim 8 recites "5 to 40% by weight of a polycarbonate polyol").

Moreover, there is no description in Greco (USP 5,288,839) that the polyester described therein is a polyester polyol (which means a reaction product of an aliphatic dicarboxylic acid and an aliphatic diol, as disclosed on page 4, lines 25 to 26 and page 6, lines 6 to 7 of the present specification). Rather the

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008

polyester of Greco (USP 5,288,839) is a commercially vitreous polyester of phthalic and isophthalic acid as disclosed at column 7, lines 34 to 37 (EXAMPLE 15) thereof, and this polyester comprises only dicarboxylic acid and does not contain any polyol component.

In the present specification, there is a comparative example (Comparative example 5 in Table 1 on page 18 of the present specification), which contains 50% by weight of polycarbonate polyol (UH100 HD-PCD (1000)). When the reactive hot melt composition contains 50% by weight of polycarbonate polyol, such a composition has a longer set time and a longer open time, as set forth in Table 1 (contd.) on page 19 of the present specification, so that it takes a much longer time to obtain a cured product.

The main component of Greco (USP 5,288,839) is a polycarbonate diol and up to 50% by weight of a polyester may be contained, as described at column 4, lines 54 to 60 thereof. From this description, the composition of Greco (USP 5,288,839) contains 50% by weight or more of the polycarbonate diol. When the hot melt composition of applicants' present claims contains 50% by weight or more of a polycarbonate polyol, as shown in

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008

Comparative examples 4 and 5 shown in Table 1 on pages 18 and 19 of the present specification, good results are not obtained.

As discussed in the Background Art on page 1, line 14 to page 3, line 11 of the present specification, a crystalline polyester polyol has been used to improve the curing speed (page 1, lines 23 to 30 of the present specification) and a reactive hot melt adhesive obtained by the reaction of a polycarbonate series polyol, and a polyisocyanate has been known to improve the initial adhesion force and heat-resistant adhesion force, etc. (page 2, lines 10 to 33 of the present specification). However, as discussed in the paragraph bridging pages 2 and 3 of the present specification, prior to the present invention, there was no disclosure concerning an adhesive property to a metal, particularly to aluminum. With respect to applicants' present claims, by using a crystalline polyester polyol and a polyester polyol produced by an aromatic polycarboxylic acid and an aliphatic polyol, in combination with a polycarbonate polyol, the present inventors were the first to discover that a hot melt composition using such a polyol mixture in combination with a polyisocyanate results in a desirable adhesive property to a metal, particularly to aluminum. It is respectfully submitted

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JUL 18 2008

Appl. No. 10/529,780  
Reply to Office Action mailed April 24, 2008

that such a property could not be expected from disclosures of the references.

Withdrawal of the 35 USC 103 rejection is thus respectfully requested.

Reconsideration is requested. Allowance is solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below.

Respectfully submitted,



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